

## Circuit II

PAGE

1

DATE

25-02-2016

Summary:-

$$q = CV \rightarrow \text{Charge} \quad i = C \frac{dV}{dt} \rightarrow \text{current}$$

$$V = \frac{1}{C} \int_{t_0}^t i dt + V(t_0) \rightarrow \text{Voltage}$$

$$P = Vi = CV \frac{dV}{dt} \rightarrow \text{power}$$

$$W = \frac{1}{2} CV^2 \rightarrow \text{Energy}$$

using Eq.

$$q = CV \Rightarrow W = \frac{q^2}{2C} \rightarrow \text{Energy}$$

[1]  $C = 3 \text{ mF}$      $q = 0.12$     find voltage, energy

$$q = CV \Rightarrow V = \frac{q}{C} = \frac{0.12 \text{ m}}{3 \text{ m}} = 0.04 \text{ V}$$

$$W = \frac{1}{2} CV^2 = \frac{1}{2} \times (3 \times 10^{-3}) \times (0.04)^2 = 2.4 \times 10^{-6} \text{ J}$$

[2]

$$V(t) = 50 \sin 2000t \text{ V}$$

Determine the current through the capacitor

Sol.

$$i(t) = C \frac{dv}{dt} = 10 \times 10^{-3} \frac{d}{dt} (50 \sin 2000t)$$

$$= 2000 \times 10 \times 10^{-3} \times 50 \cos 2000t$$

$$= 1000 \cos 2000t \text{ A}$$

[3]

$$C = 100 \text{ mF}$$

$$i(t) = 50 \sin 120\pi t \text{ mA}$$

find voltage at  $t = 1 \text{ ms}$  and  $t = 5 \text{ ms}$

$$\text{take } V(0) = 0$$

Sol.

$$V = \frac{1}{C} \int_{t_0}^t i dt + V(t_0)$$

$$= \frac{1}{100 \times 10^{-3}} \int_0^t 50 \sin 120\pi t dt \times 10^{-3}$$

$$= \frac{50 \times 10^{-3}}{100 \times 10^{-3} \times 120\pi} \cos 120\pi t \Big|_0^t$$

$$\text{at } t = 1 \text{ ms}$$

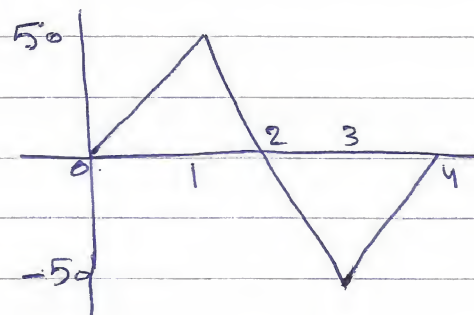
$$\text{at } t = 5 \text{ ms}$$

$$V = \dots$$

$$V = \dots$$

4) المعادلة

$$V(t) = \begin{cases} 50t & 0 < t < 1 \\ 100 - 50t & 1 < t < 3 \\ -200 + 50t & 3 < t < 4 \\ 0 & \text{other wise} \end{cases}$$



$y = mt + c$  . نأخذ ما را الى الخ الـ قيم

at  $t=0$  (0,0) ونأخذ ما را الى الخ الـ قيم

$$0 = m \cdot 0 + c \quad \boxed{C=0} \rightarrow (1)$$

at  $t=1$  (1,50)

$$50 = m \cdot 1 + 0$$

$$\boxed{m=50} \rightarrow (2)$$

$$y = 50t + 0$$

$$y = 50t$$

$$V = 50t$$

4) حل

an initially uncharged 1mF capacitor has the Current shown in Fig calculate The voltage across it at  $t=2ms$  and  $t=5ms$

assimagnet

